Change 317th Board referenced change (for HD 1.1) from: CH5.5.2.2 (Page 5-12 and 5-13)
to: CH5.5.3.2 (Page 5-12 and 5-13).

C9.2.1.3. When Hazard Divisions 1.1 and 1.2 (1.2.1, 1.2.2, and/or 1.2.3) are located in the same site, determine the distances for the total quantity considered first as 1.1 and then as 1.2. The required distance is the greater of the two. When the HD 1.1 requirements are controlling and the HE equivalence [Net Explosive Weight for Quantity-Distance (NEWQD)] exists for the HD 1.2 item(s) and is less than the NEW (See paragraph C9.3.2.2.), the HE equivalent weight of the 1.2 items may be added to the total explosive weight of 1.1 items to determine the NEW for 1.1 distance determination; otherwise, the total explosive weight of all the HD 1.2 items (1.2.1, 1.2.2, and/or 1.2.3, including the net propellant weights) is to be added to the total explosive weight of the HD 1.1 items to determine the NEW for 1.1 distance determination.

C9.3.2. Hazard Division 1.2 (Tables C9.T6. through C9.T9.)

C9.3.2.1. HD 1.2 are items configured for storage and transportation that do not mass detonate when a single item or package in a stack is initiated. Explosions involving the items result in their burning and exploding progressively with no more than a few at a time reacting. These reactions will project fragments, firebrands, and unexploded items from the explosion site. Blast effects are limited to the immediate vicinity and are not the primary hazard.

C9.3.2.2. The Net Explosive Weight (NEW) of an item (used for transportation) is the sum of the weight of the HD 1.1 and 1.3 material contained in an item. The Net Explosive Weight for Quantity Distance (NEWQD) for an item is equal to NEW (NEWQD = NEW) unless testing has been conducted. Based on testing, the NEWQD may include a reduced contribution (less than or equal to 100%) from the HD 1.3 material as a result of the HD 1.1 material being functioned. The NEWQD should be determined by the Single Package Test (UN Test 6 (a) or its equivalent), not the Bonfire Test (UN Test 6 (c)). The NEWQD for a specific item may be obtained from the Joint Hazard Classification System (JHCS). The effects produced by the functioning of HD 1.2 items vary with the size and weight of the item. HD 1.2 ammunition is separated into two sub-divisions in order to account for the differences in magnitude of these effects for purposes of setting quantity-distance criteria. The more hazardous items are referred to as HD 1.2.1 items and have an NEWQD greater than 1.60 pounds. The less hazardous items, referred to hereafter as HD 1.2.2, have an NEWQD less than or equal to 1.60 pounds. These two HD 1.2 sub-divisions are shown below with their definitions:

HD 1.2.1:	NEWQD > 1.60 pounds
HD 1.2.2:	NEWQD $\leq$ 1.60 pounds

It is important not to exaggerate the significance of the value of 1.60 pounds used above. It is based on a break point in the database supporting the quantity-distance relationships and tables and the NEWQD of the rounds tested. If comprehensive data are available for a particular item, then the item may be placed in that category of HD 1.2 supported by the data and allocated the relevant quantity-distances.

C9.3.2.3. The Maximum Credible Event (MCE) for HD 1.2.1 is the NEWQD of an item times the number of items in three unpalletized, outer shipping packages, unless a different MCE is demonstrated by testing or analogy. The authorized MCE for a specific HD 1.2.1 item is listed in the Joint Hazard Classification System (JHCS) (reference (e)).

C9.3.2.4. The quantity distances specified for HD 1.2 ammunition achieve the desired degree of protection against immediate hazards from an incident. Events involving HD 1.2 items lob large amounts of unexploded rounds, components, and subassemblies, which will remain hazardous after impact. Such items are likely to be more hazardous than in their original state because of possible damage to fuze safety devices or other features by heat and impact. Many types of ammunition containing sub-munitions, such as cluster bombs, can be expected to be projected out to distances as great as the relevant inhabited building distances. Furthermore, it is impractical to specify quantity distances which allow for the maximum possible flight ranges of propulsive items.

C9.3.2.5. Tables C9.T6A. and C9.T6B. and Table C9.T7. provide the appropriate inhabited building distances (IBD), public traffic route distances (PTR), and intraline distances (ILD) for HD 1.2.1 and HD 1.2.2 ammunition, respectively. When HD 1.2.1 items are stored in structures which may contribute to the debris hazard, the IBD is determined by using the larger of the following two distances: either that given in Table C9.T6A. for the appropriate Explosive Weight (number of items x NEWQD) or that given in Table C9.T6B. for the appropriate MCE.

C9.3.2.6. Intermagazine distances (IMD) are dependent upon the types of structures acting as both the Potential Explosion Site (PES) and the Exposed Site (ES). Table C9.T8. provides a matrix of all the appropriate separations for the various combinations of ES and PES.

C9.3.2.7. PTR distances given in Tables C9.T6., C9.T7. and C9.T8. give consideration to the transient nature of the exposure in the same manner as for HD 1.1. PTR distance is computed as 60% of the IBD for items in this hazard division, with a minimum distance equal to the Intermagazine Distance given in Table C9.T8. for light structures, open stacks, trucks, trailers, or rail cars. Such structures are designated as AGS (L) in Table C9.T8.

C9.3.2.8. ILD given in Tables C9.T6. and C9.T7. and C9.T8. take into account the progressive nature of explosions involving these items (normally resulting from fire spread), up to the magnitude of the MCE, and the ability to evacuate personnel from endangered areas before the progression involves large numbers of items. Exposed structures may be extensively damaged by projections and delayed propagation of explosions may occur due to the ignition of combustibles by projections. ILD is computed as 36% of the IBD for items of this HD, with a minimum distance equal to the Intermagazine Distances given in Table C9.T8. for the applicable PES-ES combination.

C9.3.2.9. When storing mixed sub-divisions of HD 1.2 ammunition (HD 1.2.1 and HD 1.2.2), the following rule shall apply: Consider each sub-division separately and apply the greater of the two distances. The general mixing rules for HD 1.2 ammunition are given in Table C9.T9.

C9.3.2.10. For reasons of operational necessity, limited quantities of HD 1.2.2 items may be stored in facilities such as hangars, troop buildings, and manufacturing or operating buildings without regard to quantity distance. Fragmentation shielding will be provided.

C9.3.2.11. Unit Risk HD 1.2 is a special storage sub-division (HD 1.2.3) for ammunition that satisfies either of the following sets of criteria:

C9.3.2.11.1. Ammunition that satisfies the criteria for HD 1.6 with the exception of containing a non-EIDS device, or

C9.3.2.11.2. Ammunition that does not exhibit any sympathetic detonation response in the stack test (United Nations (UN) Test 6(b)) or any reaction more severe than burning in the external fire test (UN Test 6(c)), bullet impact test (UN Test 7(j)), and the slow cook-off test (UN Test 7(h)).

C9.3.2.12. The IBD for Unit Risk HD 1.2 (HD 1.2.3) is determined using Table C9.T10. (HD 1.3 Quantity-Distances) for the NEWQD for the HD 1.2.3 item multiplied by the number of rounds with a hazardous fragment distance based on the HD 1.1 hazardous fragment areal number density criteria applied to a single round of the HD 1.2.3 ammunition. The hazardous fragment distance is specified in hundreds of feet in parentheses as "(xx) 1.2.3." PTR for Unit Risk HD 1.2 ammunition is based on 60% of IBD. ILD is computed as 36% of IBD, with a minimum distance equal to the Intermagazine Distances given in Table C9.T8.

C9.3.2.13. For storage of mixed Unit Risk HD 1.2 (HD 1.2.3) ammunition, multiply the NEWQD for the HD 1.2.3 items by the corresponding number of HD 1.2.3 rounds and use Table C9.T10. with a hazardous fragment distance based on the largest hazardous fragment distance for the HD 1.2.3 ammunition in storage. When HD 1.2.3 ammunition is located with any other Hazard Division 1.2 sub-division, use the distances given in Table C9.T9. When HD 1.2.3 ammunition is located with any other HD ammunition, the HD 1.2.3 ammunition is considered HD 1.2 (HD 1.2.1 or HD 1.2.2, according to NEWQD) for quantity-distance purposes. The mixing rules provided in subsection C9.2.1. above then apply to the combination of the hazard divisions.

C9.3.2.14. HD 1.2 ammunition in the current inventory with IBD given in hundreds of feet and presented in parentheses in the format HD (xx)1.2, need not use the quantity-distance criteria specified above. Instead, constant value quantity-distance criteria for these items may be specified as follows: IBD is the distance specified in hundreds of feet (in parentheses); PTR is computed as 60% of IBD; ILD is computed as 36% of IBD, with a minimum distance equal to the Intermagazine Distances given in Table C9.T8.

TABLE C9.T6A. HAZARD SUB-DIVISION 1.2.1 QUANTITY-DISTANCES (IBD, PTR, ILD) FOR MUNITIONS WITH NEWQD > 1.60 POUNDS

EXPLOSIVE WEIGHT[1] (lbs)	IBD[2,3,4] (ft)	PTR[5] (ft)	ILD[6] (ft)	EXPLOSIVE WEIGHT[1] (lbs)	IBD[2,3,4] (ft)	PTR[5] (ft)	ILD[6] (ft)
				7,000	1033	620	372
2	200	200	200	8,000	1055	633	380
5	200	200	200	9,000	1074	644	387
10	200	200	200	10,000	1091	654	393
20	200	200	200	15,000	1154	693	416
40	200	200	200	20,000	1199	719	432
60	200	200	200	25,000	1233	740	444
80	224	200	200	30,000	1260	756	454
100	268	200	200	40,000	1303	782	469
150	348	209	200	50,000	1335	801	481
200	404	242	200	60,000	1362	817	490
300	481	289	200	70,000	1384	830	498
400	535	321	200	80,000	1402	841	505
600	610	366	220	90,000	1419	851	511
800	662	397	238	100,000	1434	860	516
1,000	702	421	253	150,000	1489	894	536
1,500	774	464	279	200,000	1528	917	550
2,000	824	494	297	250,000	1558	935	561
2,500	862	517	310	300,000	1582	949	569
3,000	893	536	322	350,000	1601	961	577
3,500	919	551	331	400,000	1619	971	583
4,000	941	565	339	450,000	1633	980	588
5,000	978	587	352	500,000	1646	988	593
6,000	1008	605	363	>500,000	Note 4	Note 5	Note 6

NOTES

(1) Explosive Weight = Number of Items x NEWQD.

(2) IBD = -735.186 + [237.559 x (ln(Number of items x NEWQD))] – [4.274 x (ln(Number of items x NEWQD))^2], with a minimum of 200 feet; IBD in feet, NEWQD in pounds; ln is natural logarithm. [71 < explosive weight]

(3) Number of items x NEWQD = exp[27.791 – (600.392 – 0.234 x IBD)$^{1/2}$];
IBD in feet, NEWQD in pounds; exp (x) is e^x. [200 < IBD < 2016]

(4) Use of equations given in Notes (2) and (3) to determine other IBD-weight combinations is allowed.

(5) PTR = 60% of IBD with a minimum distance equal to the Intermagazine Distance given in Table C9.T8. for light structures, open stacks, trucks, trailers, or rail cars. Such structures are designated as AGS (L) in Table C9.T8. For other structures as either ES or PES, see Table C9.T8.

(6) ILD = 36% of IBD with a minimum distance equal to the Intermagazine Distance given in Table C9.T8. for the applicable PES-ES combination. For structures other than AGS(L) as either ES or PES, see Table C9.T8.

GENERAL COMMENTS

(a) The quantity-distance criteria for HD 1.2.1 items are based on the hazards from primary fragments. When stored in structures which may contribute to the debris hazard (secondary fragments), the IBD for HD 1.2.1 items whose MCE is greater than 31 pounds is determined by using the larger of the following two distances: those given in this table for the appropriate Explosive Weight or those given in Table C9.T6B. for the appropriate MCE. Structures that may contribute to the debris hazard for storage of HD 1.2.1 ammunition include: (a) all earth-covered magazines (ECMs) – Frontal exposure only. Side and rear exposures have fixed minimum distances for IBD; (b) all aboveground sites (AGSs)—Including heavy wall (H), heavy wall/roof (H/R), and light wall (L) as defined in Table C9.T8., unless data/analyses are provided to show that the structural debris contribution is less. Note that ILD and PTR are based on 36% and 60%, respectively, of the applicable IBD as determined in this note with the following minimum distances: ILD minimum distances are given in Table C9.T8. for applicable PES-ES combinations and PTR minimum distances are given in Table C9.T8. for AGS(L).

(b) See Table C9.T8. for a summary of Intermagazine Distances (IMD) and minimum distances for ILD and PTR.

TABLE C9.T6B. HAZARDOUS DEBRIS DISTANCES FOR HD 1.2.1 ITEMS STORED IN STRUCTURES WHICH CAN CONTRIBUTE TO THE DEBRIS HAZARD

MCE (lbs)	HAZARDOUS DEBRIS DISTANCE[1,2] (ft)	PTR[4] (ft)	ILD[5] (ft)
≤ 31	200	200	200
35	249	200	200
40	301	200	200
45	347	208	200
50	388	233	200
75	546	328	200
100	658	395	237
125	744	446	268
150	815	489	293
175	875	525	315
200	927	556	334
225	973	584	350
250	1014	608	365
275	1051	631	378
300	1085	651	391
325	1116	670	402
350	1145	687	412
375	1172	703	422
400	1197	718	431
425	1220	732	439
450	1243	746	447
>450	1250	750	450

NOTES

(1) Hazardous Debris Distance = -1133.9 + [389 x ln(MCE)]; [31 < MCE ≤ 450]
MCE in pounds, Hazardous Debris Distance in feet with a minimum distance of 200 feet; ln is natural logarithm.

(2) MCE = exp [(Hazardous Debris Distance/389) + 2.914]; [200 < Hazardous Debris Distance ≤ 1250]
MCE in pounds, Hazardous Debris Distance in feet; exp [x] is e^x.

(3) Use of equations given in Notes (1) and (2) to determine other Hazardous Debris Distance-MCE combinations is allowed.

(4) PTR = 60% of IBD with a minimum distance equal to the Intermagazine Distance given in Table C9.T8. for light structures, open stacks, trucks, trailers, or rail cars. Such structures are designated as AGS (L) in Table C9.T8. For other structures as either ES or PES, see Table C9.T8.

(5) ILD = 36% of IBD with a minimum distance equal to the Intermagazine Distance given in Table C9.T8. for the applicable PES-ES combination. For structures other than AGS(L) as either ES or PES, see Table C9.T8.

GENERAL COMMENTS

(a) The quantity-distance criteria for HD 1.2.1 items are based on the hazards from primary fragments. When stored in structures which may contribute to the debris hazard (secondary fragments), the IBD for HD 1.2.1 items whose MCE is greater than 31 pounds is determined by using the larger of the following two distances: those given in Table C9.T6A. for the appropriate Explosive Weight or those given in this table for the appropriate MCE. Structures that may contribute to the debris hazard for storage of HD 1.2.1 ammunition include: (a) all earth-covered magazines (ECMs) – Frontal exposure only. Side and rear exposures have fixed minimum distances for IBD; (b) all aboveground sites (AGSs)—Including heavy wall (H), heavy wall/roof (H/R), and light wall (L) as defined in Table C9.T8., unless data/analyses are provided to show that the structural debris contribution is less. Note that ILD and PTR are based on 36% and 60%, respectively, of the applicable IBD as determined in this note with the following minimum distances: ILD minimum distances are given in Table C9.T8. for applicable PES-ES combinations and PTR minimum distances are given in Table C9.T8. for AGS(L).

(b) See Table C9.T8. for a summary of Intermagazine Distances (IMD) and minimum distances for ILD and PTR.

TABLE C9.T7. HAZARD SUB-DIVISION 1.2.2 QUANTITY-DISTANCES (IBD, PTR, ILD) FOR MUNITIONS WITH NEWQD ≤ 1.60 POUNDS

EXPLOSIVE WEIGHT [1] (lbs)	IBD [2,3,4] (ft)	PTR [5] (ft)	ILD [6] (ft)	EXPLOSIVE WEIGHT [1] (lbs)	IBD [2,3,4] (ft)	PTR [5] (ft)	ILD [6] (ft)
1	100	100	100	7,000	366	220	132
2	100	100	100	8,000	376	226	135
5	100	100	100	9,000	385	231	139
10	100	100	100	10,000	394	236	142
20	100	100	100	15,000	427	256	154
40	113	100	100	20,000	451	271	162
60	123	100	100	25,000	471	282	169
80	131	100	100	30,000	487	292	175
100	138	100	100	40,000	514	308	185
150	152	100	100	50,000	535	321	193
200	162	100	100	60,000	553	332	199
300	179	107	100	70,000	568	341	204
400	192	115	100	80,000	581	349	209
600	211	127	100	90,000	593	356	214
800	226	136	100	100,000	604	362	217
1,000	238	143	100	150,000	647	388	233
1,500	262	157	100	200,000	678	407	244
2,000	279	168	101	250,000	703	422	253
2,500	294	176	106	300,000	723	434	260
3,000	306	183	110	350,000	741	445	267
3,500	316	190	114	400,000	757	454	272
4,000	325	195	117	450,000	771	462	277
5,000	341	205	123	500,000	783	470	282
6,000	355	213	128	>500,000	Note 4	Note 5	Note 6

NOTES

(1) Explosive Weight = Number of Items x NEWQD.

(2) IBD = 101.649 - [15.934 x (ln(Number of items x NEWQD))] + [5.173 x (ln(Number of items x NEWQD))^2], with a minimum of 100 feet; IBD in feet, NEWQD in pounds; ln is natural logarithm. [20 < Explosive Weight]

(3) Number of items x NEWQD = exp [1.5401 + (-17.278 + 0.1933 x IBD)$^{1/2}$];
IBD in feet, NEWQD in pounds; exp (x) is e^x. [100 <IBD < 1240]

(4) Use of equations given in Notes (2) and (3) to determine other IBD-weight combinations is allowed

(5) PTR = 60% of IBD with a minimum distance equal to the Intermagazine Distance given in Table C9.T8. for light structures, open stacks, trucks, trailers, or rail cars. Such structures are designated as AGS (L) in Table C9.T8. For other structures as either ES or PES, see Table C9.T8.

(6) ILD = 36% of IBD with a minimum distance equal to the Intermagazine Distance given in Table C9.T8. for the applicable PES-ES combination. For structures other than AGS (L) as either ES or PES, see Table C9.T8.

GENERAL COMMENTS

(a) The quantity-distance criteria for HD 1.2.2 items are based on the hazards from primary fragments.

(b) See Table C9.T8. for a summary of Intermagazine Distances (IMD) and minimum distances for ILD and PTR.

TABLE C9.T8. SUMMARY OF HAZARD SUB-DIVISIONS 1.2.1, 1.2.2, AND 1.2.3 QUANTITY-DISTANCES

To EXPOSED SITE (ES)		From POTENTIAL EXPLOSION SITE (PES)				
		ECM		AGS		
		S or R	F	(H)	(H/R)	(L)
ECM (7 bar/3 bar) (IMD)	S	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)
	R	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)
	FU	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)
	FB	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)
ECM (Undefined) (IMD)	S	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)
	R	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)
	FU	0 (note 1)	200/300/100	200/300/100	200/300/100	200/300/100
	FB	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)
AGS (H/R) (IMD)	U or B	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)
AGS (H or L) (IMD)	U or B	0 (note 1)	200/300/100	200/300/100	0 (note 1)	200/300/100
ILD[5]		0 (Note 1)	Note 2	0 (Note 1)	0 (Note 1)	Note 2
PTR[5]		200/300/100	Note 3	Note 3	Note 3	Note 3
IBD[5]		200/300/100	Note 4	Note 4	Note 4	Note 4

(note: all distances are in feet)

LEGEND

S—Side; **R—**Rear; **F—**Front: **B—**Barricaded; **U—**Unbarricaded; **FU—**Front Unbarricaded; **FB—**Front Barricaded.
ECM—Earth-Covered Magazine (7-bar, 3-bar, undefined refers to the strength of the headwall).
AGS—Aboveground site; aboveground, non earth-covered magazine, structure or storage pad.
AGS (H)—Aboveground site, Heavy Wall; Buildings with wall thickness $\geq$ 12 inches of reinforced concrete; as an ES, door must be barricaded if it faces a PES.
AGS (H/R)—Aboveground site, Heavy Wall and Roof; AGS (H) with roof thickness > 5.9 inches of reinforced concrete; as an ES, door must be barricaded if it faces a PES; side/rear exposures may or may not be barricaded.
AGS (L)—Aboveground site, Light; Light structure, open stack, truck, trailer, or railcar.
IMD—Intermagazine Distance; **ILD—**Intraline Distance;
PTR—Public Traffic Route Distance; **IBD—**Inhabited Building Distance.

NOTES

(1) Practical considerations such as firefighting and security will dictate specific separation distances as specified by DoD Component.
(2) ILD = 36% of IBD with a minimum distance equal to the Intermagazine Distance given in this table for the applicable PES-ES combination.
(3) PTR = 60% of IBD with a minimum distance equal to the Intermagazine Distance given in this table for light structures, open stacks, trucks, trailers, or rail cars. Such structures are designated as AGS (L).
(4) For HD 1.2.1 items, use the larger of the two applicable values given in Tables C9.T6A. and C9.T6B; for HD 1.2.2 items use Table C9.T7.
(5) See Paragraph C9.3.2.12 for HD 1.2.3.

GENERAL COMMENTS

(a) Where three distances are given, the first refers to HD 1.2.1 items with an MCE < 100 pounds, the second to HD 1.2.1 items with an MCE $\geq$ 100 pounds, and the third refers to HD 1.2.2 items.
(b) For an ES containing only HD 1.2.3 items, the IMD from any PES to such an ES is 0 (Note 1).

TABLE C9.T9. HAZARD SUB-DIVISION 1.2.1, 1.2.2, AND 1.2.3 MIXING RULES

HAZARD SUB-DIVISION INVOLVED	DISTANCES TO BE APPLIED
1.2.1	Apply HD 1.2.1 distances[1]
1.2.2	Apply HD 1.2.2 distances[2]
1.2.3	Apply HD 1.2.3 distances[3]
1.2.1 + 1.2.2	Apply greater of two distances
1.2.1 + 1.2.3	Apply greater of two distances
1.2.2 + 1.2.3	Apply greater of two distances

NOTES

(1) HD 1.2.1 distances given in Tables C9.T6A., C9.T6B., and C9.T8.
(2) HD 1.2.2 distances given in Tables C9.T7. and C9.T8.
(3) HD 1.2.3 distances given in Table C9.T10. (See paragraph C9.3.2.12.)